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First Named Inventor or Application Identifier

Lambros Apostolopoulos

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APPLICATION ELEMENTSADDRESS TO: Assistant Commissioner for Patents
Box Patent Application
Washington, D.C. 20231

See MPEP chapter 600 concerning utility patent application contents

1. ☒ Fee Transmittal Form
(Submit an original, and a duplicate for fee processing)
2. ☒ Specification [Total Pages / 22 /]
(preferred arrangement set forth below)
- Descriptive title of the Invention
 - Cross References to Related Applications
 - Statement Regarding Fed sponsored R&D
 - Reference to Microfiche Appendix
 - Background of the Invention
 - Brief Summary of the Invention
 - Brief Description of the Drawings (if filed)
 - Detailed Description
 - Claim(s)
 - Abstract of the Disclosure
3. ☒ Drawing(s) (35 USC 113) [Total Sheets / 9 /]
4. ☒ Oath or Declaration [Total Pages / 5 /]
- a. ☐ Newly executed (original or copy)
 - b. ☒ Copy from a prior application (37 CFR 1.63(d))
(for continuation/divisional with Box 17 completed)
[Note Box 5 below]
 - i. ☐ **DELETION OF INVENTOR(S)**
Signed statement attached deleting inventor(s) named
in the prior application, see 37 CFR 1.63(d)(2) and
1.33(b).
5. ☐ Incorporation By Reference (useable if Box 4b is checked)
The entire disclosure of the prior application, from
which a copy of the oath or declaration is supplied
under Box 4b, is considered as being part of the
disclosure of the accompanying application and is
hereby incorporated by reference therein.

6. ☐ Microfiche Computer Program (Appendix)
7. Nucleotide and/or Amino Acid Sequence Submission
(if applicable, all necessary)
- a. ☐ Computer Readable Copy
 - b. ☐ Paper Copy (identical to computer copy)
 - c. ☐ Statement verifying identity of above c

ACCOMPANYING APPLICATION PARTS

8. ☐ Assignment Papers (cover sheet & document(s))
9. ☐ 37 CFR 3.73(b) Statement ☐ Power of Attorney
(when there is an assignee)
10. ☐ English Translation Document (if applicable)
11. ☐ Information Disclosure ☐ Copies of IDS
Statement (IDS)/PTO-1449 Citations
12. ☒ Preliminary Amendment
13. ☒ Return Receipt Postcard (MPEP 503)
(Should be specifically itemized)
14. ☐ Small Entity ☐ Statement filed in prior application,
Statement(s) Status still proper and desired
15. ☐ Certified Copy of Priority Document(s)
(if foreign priority is claimed)
16. ☒ Other: check, postcard

17. If a CONTINUING APPLICATION, check appropriate box and supply the requisite information:☒ Continuation ☐ Divisional ☐ Continuation-in-part (CIP) of the prior application No: 08 /912,405**18. CORRESPONDENCE ADDRESS**

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Martin G. Linihan
Name

Signature

BFLODOCS 253644

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of

Lambros Apostolopoulos

A Continuation of Application

Ser. No. 08/912,405 filed August 18, 1997 as a Continuation
of Application Ser. No. 08/506,685

Filed July 25, 1995 now Patent No. 5,730,248

For: Bridge Platform

PRELIMINARY AMENDMENT

Assistant Commissioner for Patents

Washington, D.C. 20231

Sir:

Upon the granting of a serial number and filing date to the above continuation application,
please amend the application as follows:

In the Claims

Please rewrite claims 1 and 2 in amended form as follows:

1. (Amended) A platform for installation below [the] a deck of a bridge and for
extending along a section of [the] a bridge for supporting persons performing work on [the] a
bridge and for collecting debris resulting from the work, said platform comprising:

- a) a plurality of cables for extending along [the] a bridge and in spaced relation to
each other and in a plane substantially parallel to the plane of [the] a bridge deck;
- b) means at each end of said cables for securing said cables to [the] a bridge so that
the plane of the cables is at a desired distance below the portion of [the] a bridge
upon which work is to be performed;

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- c) a plurality of flooring sections each extending transversely of the cables and resting on said cables, said flooring sections [being arranged] comprising elongated rectangular decking panels arranged in end-to-end relation transversely of the cables and in side-by-side relation longitudinally of the cables, each of said flooring sections having at least one opening therein; [and]
 - d) means for releasably securing each of said flooring sections to said cables and comprising a plurality of connector assemblies, at least one for each of said flooring sections, each assembly having a part engaging the corresponding flooring section and a part extending through the opening in the flooring section for engaging the cable, each assembly being disconnectable so that each individual flooring section can be removed to allow access through the flooring; and
 - e) said means for securing said cables to a bridge comprising a plurality of compression clamp assemblies, at least one assembly at each end of said plurality of cables, each assembly comprising a pair of assembly portions for contacting opposite surfaces of a bridge structure and compression force applying means operatively associated with said assembly portions for forcing said assembly portions against opposite surfaces of a bridge structure.

2. (Amended) A [bridge] platform according to claim 1, wherein said means for securing said cables to [the] a bridge [secures] is for securing said cables to spaced-apart piers of [the] a bridge.

Please cancel claim 3 in view of the amendment to claim 1.

Please rewrite claim 4 in amended form as follows:

4. (Amended) A [bridge] platform according to claim 1, wherein said [flooring sections comprise] elongated rectangular decking panels are arranged in [end-to-end] overlapping relation transversely of the cables and in [side-to-side] overlapping relation longitudinally of the cables.

Claim 5, on line one delete "bridge" and change "4" to -- 1 --.

Please cancel claim 6.

Claim 7, on line one delete "bridge".

Please cancel claim 8.

Please rewrite claims 9 and 10 in amended form as follows:

9. (Amended) A [bridge] platform according to claim [7] 1, wherein some of said connector assemblies further include means for connection to one end of an auxiliary supporting cable, the other end of which is [secured] for securing to [the] a bridge to provide additional support for said platform.

10. (Amended) A [bridge] platform according to claim 1, further including tarpaulin enclosures for extending between said platform and [the] a bridge for defining a region between said platform and [the] a bridge which enhances containment of the debris.

Please cancel claims 11-14.

Please add new claims 15-20 as follows:

15. A platform for installation below a deck of a bridge and extending along a section of a bridge for supporting persons performing work on a bridge and for collecting debris resulting from the work, said platform comprising:

- a) a plurality of cables for extending along a bridge and in spaced relation to each other and in a plane substantially parallel to the plane of a bridge deck;
- b) means at each end of said cables for securing said cables to a bridge so that the plane of the cables is at a desired distance below the portion of a bridge upon which work is to be performed;
- c) a plurality of flooring sections each extending transversely of the cables and resting on said cables, said flooring sections being arranged in side-by-side relation longitudinally of the cables, said flooring sections comprising elongated rectangular panels arranged in end-to-end overlapping relation transversely of the cables and in side-to-side overlapping relation longitudinally of the cables; and
- d) said means for securing said cables to a bridge comprising a plurality of compression clamp assemblies, at least one assembly at each end of said plurality of cables, each assembly comprising first beam means for contacting a surface of a bridge structure, second beam means for contacting an opposite surface of said bridge structure and compression force applying means connected to said first and second beam means for forcing said first and second beam means against said surfaces of said bridge structure.

16. A platform according to claim 15, wherein said flooring sections comprise corrugated elongated rectangular decking panels with the corrugations extending transversely of the cables.

17. A platform according to claim 15, wherein said means for securing said cables to a bridge is for securing said cables to spaced-apart piers of a bridge.

18. A platform according to claim 17, wherein said means for securing said cables to bridge piers comprises a pair of compression clamp structures, one for clamping on each of the piers, and said cables are connected at opposite ends thereof to said clamp structures.

19. A platform according to claim 18, wherein each of said compression clamp structures comprises a single beam for contacting two pedestals of a pier, a pair of beams for contacting corresponding ones of the pedestals and connecting rods for tightening said pair of beams and said single beam against the pedestals.

20. A platform for installation below the deck of a bridge and extending along a section of a bridge for supporting persons performing work on a bridge and for collecting debris resulting from the work, said platform comprising:

- a) a plurality of cables for extending along a bridge and in spaced relation to each other and in a plane substantially parallel to the plane of a bridge deck;
- b) means at each end of said cables for securing said cables to a bridge at a location below a bridge deck so that the plane of the cables is at a desired distance below the portion of a bridge upon which work is to be performed; and

- c) a plurality of flooring sections each extending transversely of the cables and resting on said cables, said flooring sections being arranged in side-by-side relation longitudinally of the cables, said flooring sections comprising corrugated elongated rectangular decking panels with the corrugations extending transversely of the cables, said corrugations maximizing strength-to-weight ratio of said platform and providing receptacles to facilitate collection and removal of debris.

Respectfully submitted,

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BRIDGE PLATFORM

Background of the Invention

This invention relates to the art of working platforms for supporting persons performing work on structures, and more particularly to a new and improved platform installed below the deck or roadway of a bridge.

It is necessary to periodically clean and repaint the surfaces of steel bridges to prevent corrosion and deterioration of the steel supporting structure. This, in turn, creates the need to provide a safe and effective support for workmen performing the cleaning and painting of the surfaces beneath the deck or roadway of the bridge. In addition, environmental concerns and regulations give rise to the need for containing the debris from the cleaning operation as well as paint residue and spillage.

A number of bridge platforms have been proposed but many are complex structures and time consuming to erect and dismantle. Other prior art platforms are not sufficiently rigid or are limited in height, i.e., the distance between platform flooring and bridge steel structure, due to the manner in which they are attached to the bridge. Some prior platforms extend for only a short distance longitudinally of the bridge and are limited in that respect.

It would, therefore, be highly desirable to provide a new and improved bridge platform and method of erecting the same which is safe, provides a sufficiently rigid support for workman standing and walking thereon, which is simple in structure, light in weight, and therefore quick, easy and economical to erect and dismantle, which extends for a significant portion of the length of the bridge and which is effective in containing debris from the cleaning and painting operations performed on the bridge.

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Summary of the Invention

The present invention provides a bridge platform and method of erecting the same wherein a plurality of cables extend along a section of the bridge in spaced relation below the deck or roadway and steel support structure of the bridge, which cables are supported at opposite ends by a structure of the bridge such as the spaced-apart vertical piers of the bridge, and wherein a plurality of platform flooring panels or sections are supported on the cables, extend laterally of the cables, are arranged side-by-side along the section of the bridge such as between the piers and are removably secured to the cables. The cables preferably are attached to the bridge piers by compression clamp structures. The platform flooring sections comprise elongated rectangular corrugated decking panels and are arranged in end-to-end overlapping relation transversely of the cables, side-to-side overlapping relation along the bridge and with the corrugations extending transversely of the cables. The corrugations maximize the strength-to-weight ratio of the platform flooring and provide recesses or receptacles to contain debris and facilitate its collection and removal. Each of the platform flooring sections is releasably connected at spaced locations to the supporting cables on which it rests. This is provided by connector assemblies each comprising a first part which engages the upper surface of the flooring section and the cable and a second part which engages the upper surface of the flooring section, the two parts being removably connected together through a small opening in the flooring. As a result, individual flooring sections can be removed to provide access through the flooring in emergency or critical situations while at the same time allowing the remainder of the flooring to retain collected debris.

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The foregoing and additional advantages and characterizing features of the present invention will become clearly apparent upon a reading of the ensuing detailed description wherein:

Brief Description Of The Drawing Figures

Fig. 1 is a fragmentary side elevational view, partly diagrammatic, of a bridge having a platform according to the present invention installed thereon;

Fig. 2 is a fragmentary cross-sectional view, partly diagrammatic, of the bridge platform of Fig. 1;

Fig. 3 is a plan view of the bridge platform of Fig. 1;

Fig. 4 is a fragmentary side elevational view of a clamp assembly in the bridge platform of Figs. 1-3;

Fig. 5 is a fragmentary plan view of the clamp assembly of Fig. 4;

Fig. 6 is an enlarged fragmentary plan view of a portion of the assembly of Fig. 5;

Fig. 7 is an enlarged fragmentary plan view of another portion of the assembly of Fig. 5;

Fig. 8 is a plan view of one of the sections of flooring of the platform of the present invention as it appears resting on the supporting cables;

Fig. 9 is an end view of the platform section shown in Fig. 8;

Fig. 10 is a side elevational view of the flooring section of Fig. 8 with connector assemblies installed thereon for securing the flooring to the cable;

Fig. 11 is an enlarged fragmentary side elevational view of one of the connector assemblies of Fig. 10;

Fig. 12 is a side elevational view of one part of the connector assembly included in the platform of the present invention;

Fig. 13 is a plan view of the connector assembly of Fig. 12;

Fig. 14 is a side elevational view of the second part of the connector assembly of the present invention;

Fig. 15 is a plan view of the connector assembly of Fig. 14; and

Fig. 16 illustrates the platform of the present invention in combination with tarpaulin enclosures.

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Detailed Description Of The Illustrated Embodiment

Referring first to Fig. 1, there is shown a portion of a bridge 10 including a deck or roadway 12 supported by structural steel 14 which, in turn, is supported above the ground 16 by concrete piers or pedestals at regular intervals along the length of the bridge. Two piers 18 and 20 are shown on the bridge section of Fig. 1, although many such piers are included along the total length of an actual bridge. A railing 24 is shown extending along the length of bridge deck 12. The platform 30 of the present invention in the situation illustrated herein is located below the bridge deck 12 and between the piers 18, 20 and is supported from the piers 18, 20 and bridge structural steel 14. The platform 30, which will be described presently, includes a plurality of cables (not shown in Fig. 1) extending lengthwise of bridge 10 and supported at opposite ends by piers 18, 20 and a plurality of flooring sections supported by the cables, each extending transversely of the cables and also transversely of bridge 10, and the sections are in side-by-side relation along the length of bridge 10. Each flooring section is removably connected at spaced locations thereon to the cables. The platform also is supported at spaced locations therealong by the bridge structural steel 14 by means of support cables, some of which are designated 32 in Fig. 1. While the present description is directed to the single platform 30, a plurality of platforms, three of which are designated 30', 30'' and 30''' in Fig. 1 can be provided along the length of bridge 10.

Referring now to Fig. 2, there is shown one of the bridge piers, for example pier 20, which has a pair of vertical pedestals or columns 42 and 44 joined near the upper ends by a central body 46. The bridge structural steel 14 includes sidewalls 50 and 52 which rest on the tops of pedestals 42 and

44, respectively, and which are connected at spaced locations along the length of bridge 10 by a series of assemblies each including a horizontal frame member 54 and inclined frame members 56 and 58 joined at the lower ends to a central plate 60 fixed to frame member 54 and joined at the upper ends to the corresponding sidewalls 50 and 52. Thus, the bridge roadway or deck 12 is supported by the combination of the piers and steel walls 50, 52 and frame assemblies in a known manner. In addition, the walls 50, 52 and frame assemblies provide the surfaces which must be periodically cleaned, such as by abrasive blasting or the like, and painted.

As shown in Fig. 2, the supporting cables 70 of the platform 30 of the present invention extend longitudinally of bridge 10 between the piers and are spaced apart substantially equally in a transverse direction relative to bridge 10. Thus, cables 70 are disposed in a plane substantially parallel to the plane of bridge deck 12. By way of example, in an illustrative bridge having a width of about 32 feet and a distance between piers of about 140 feet, seven steel cables 70a - 70g each one-half inch in diameter are provided. The cables 70 are secured to a structure of bridge 10 so that the plane of the cables is at a desired distance below the portion of bridge 10 upon which work is to be performed. In the platform of the present illustration, cables 70a - 70g are attached at opposite ends to piers 18 and 20 by compression clamp assemblies which will be described. The platform flooring, generally designated 74 in Fig. 2, rests on and is supported by cables 70a-70g. Flooring 74 comprises a plurality of sections or panels each releasably connected to corresponding cables 70 in a manner which will be described in detail presently.

The plan view of Fig. 3 illustrates the clamping assemblies for attaching opposite ends of cables 70 to the bridge piers 18

and 20. The pedestals 42 and 44 of pier 20 are shown in Fig. 3. Pier 18 likewise has two pedestals designated 76 and 78 in Fig. 3. A first compression clamping assembly generally designated 80 secures all of the cables 70 at one end thereof, i.e. the left-hand end as viewed in Fig. 3, to pedestals 76 and 78 of pier 20. A second compression clamping assembly generally designated 82 and identical to assembly 80 secures all of the cables 70 at the opposite end thereof, i.e. the right-hand end as viewed in Fig. 3, to pedestals 42 and 44 of pier 20. Clamping assembly 80 comprises a first member or I-beam 86 extending transversely of bridge 10 and contacting both pedestals 76 and 78 on one side thereof and second and third members or I-beams 88 and 90 also extending transversely but each contacting only a corresponding one of the pedestals 76 and 78 and on the opposite side thereof. Members 86 and 88 are clamped to pedestal 76 by a plurality of threaded connecting rods 92 which are tightened to provide the required amount of compression force. Similarly, members 86 and 90 are clamped to pedestal 78 by a plurality of threaded connecting rods 94 which are tightened to provide the required amount of compression force. Thus, I-beam 86 contacts the left-hand surfaces of pedestals 76 and 78 as viewed in Fig. 3 and I-beams 88 and 90 contact the right-hand surfaces of pedestals 76 and 78, respectively, as viewed in Fig. 3. Cables 70b and 70f are connected at one end to I-beams 88 and 90, respectively, and the remaining cables 70a, 70c-70e and 70g are connected to I-beam 86. The clamping assembly and the manner of connecting cables 70 thereto will be described in further detail presently.

In a similar manner, clamping assembly 82 comprises a first member or I-beam 106 extending transversely of bridge 10 and contacting both pedestals 42 and 44 on one side thereof and second and third members or I-beams 108 and 110 also extending

transversely but each contacting only a corresponding one of the pedestals 42 and 44 and on the opposite side thereof. Members 106 and 108 are clamped to pedestal 42 by a plurality of threaded connecting rods 112 which are tightened to provide the required amount of compression force. Similarly, members 106 and 110 are clamped to pedestal 44 by a plurality of threaded connecting rods 114 which are tightened to provide the required amount of compression force. Thus, I-beam 106 contacts the right-hand surfaces of pedestals 42 and 44 as viewed in Fig. 3, and I-beams 108 and 110 contact the left-hand surfaces of pedestals 42 and 44 as viewed in Fig. 3. Cables 70b and 70f are connected at the ends to I-beams 108 and 110, respectively, and the remaining cables 70a, 70c-70e and 70g are connected to I-beams 106.

Fig. 4 illustrates in further detail a portion of one of the clamping assemblies, in particular the portion of clamping assembly 80 associated with pedestal 78 of pier 18. The arrangement illustrated in Fig. 4 is substantially similar to the portion of clamp assembly 80 associated with pedestal 76 of pier 18 and to the portions of clamps assembly 82 associated with pedestals 42 and 44 of pier 20. As shown in Fig. 4, pedestal 78 is provided with a cap 120 on which is mounted a beam bearing structure 124 on which a girder 126 of the sidewall 52 rests. I-beam 86 of clamp assembly 80 contacts the left-hand surface of pedestal cap 120 as viewed in Fig. 4 and I-beam 90 of the clamp assembly contacts the opposite or right-hand surface of cap 120. A pair of threaded connecting rods 94 join the flange of beams 86 and 90 on one side of pedestal cap 120 and a similar pair of connecting rods (not shown in Fig. 4) join the flanges of beams 86 and 90 on the opposite side of cap 120. The connection of cable 70f to beam 90 is provided by a plate-like extrusion 130 on the outer flange of beam 90 and a shackle 132 which fits in an

opening in plate 130 and is connected by a cable clamps 134 to the end of cable 70f.

As shown in Figs. 5 and 6, extension 130 which is welded to the flange of beam 90 is provided with an opening 138 to receive shackle 132. As shown in Figs. 5 and 7, I-beam 90 is provided with reinforcing spacers 140 adjacent the openings 142 in the flanges through which rods 94 extend. Rods 94 are provided with washers (not shown), nuts 144 and cotter pins 146 on each end thereof as shown in Fig. 5. By way of example, in an illustrative bridge platform, I-beams 86 and 106 are W12 X 45 I-beams each 31 feet in length, I-beams 88, 90, 108 and 110 are W6 X 15 I-beams each 7 feet in length, connecting rods 92, 94, 112 and 114 are 5/8 inch diameter threaded rods each 4½ feet long, shackles 132 are 5/8 inch diameter, clamps 134 are MIH 5/8 inch cable clamps and cables 70 are 5/8 inch diameter wire rope cables each having 6 X 19 IPS fiber core.

In the bridge 10 of the present illustration, each pier has two bearing structures 124, one on each pier pedestal. Some bridges have a large number of bearing structures per pier, for example six, in which case the cables 70 could be secured to the bearing structures without the need for the clamping assemblies 80 and 82.

Referring again to Fig. 3, the platform flooring 74 comprises a plurality of elongated rectangular panels each designated 160 which are arranged in end-to-end overlapping relation transversely of bridge 10 and cables 70, as indicated by the broken lines 162 in Fig. 3, and which panels 160 are arranged in side-by-side overlapping relation longitudinally of bridge 10 and cables 70, as indicated by the broken lines 164 in Fig. 3. Panels 160 are corrugated decking panels with the corrugations

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extending transversely of cables 70 as indicated at 166 in Fig. 3. Having corrugations 166 extending transversely of cables 70 maximizes the rigidity and strength of flooring 74 and prevents any buckling of the panels 160. Each of the platform flooring sections or panels 160 is releasably connected at spaced locations to the supporting cables 70 on which it rests. This is provided by connector assemblies generally indicated at 170 in Fig. 3 and which will be described in detail presently. As a result, individual flooring sections or panels 160 can be removed to provide access through the flooring in emergency situations. For example, if a worker becomes seriously ill or injured, one or more flooring sections 160 can be quickly and easily removed thereby allowing the worker to be lowered safely to the ground below. In addition, collected debris remains in the corrugations of the removed panel and is not lost from containment within the area of the platform.

Some of the connector assemblies, i.e. those designated 172 in Fig. 3, also have the capability of an additional or auxiliary connection to the bridge structural steel 14 and will be described in detail presently.

Fig. 8 shows in further detail two laterally adjacent panels designated 160a and 160b and their association with two of the supporting cables, for example cables 70a and 70b. Panel 160a has a pair of side edges 180a, 182a which are joined by a pair of end edges 184a, 186a. Corrugations 166a extend longitudinally along panel 160a and substantially parallel to side edges 180a, 182a. As shown in Fig. 8 the corrugations 166 of all the panels 160 in flooring 74 extend transversely of cables 70 so as to provide the required strength and rigidity of the platform 30. The corrugations 166a of panel 160a are shown in further detail in the end view of Fig. 9.

Similarly, panel 160b has a pair of side edges 180b, 182b which are joined by a pair of end edges 184b, 186b. Corrugations 166b extend longitudinally along panel 160b and substantially parallel to side edges 180b, 182b. The panels 160a and 160b are in overlapping end-to-end relation as shown by the locations of the respective end edges 186a and 184b in Fig. 3.

Each of the panels 160 comprising flooring 74 includes a plurality of openings extending therethrough for making connection to cables 70. The number and location of openings will depend upon the size of panels 160 and the distance between cables. In the panels illustrated in Fig. 8, panel 160a includes a first pair of openings 190a located near end 184a and a second pair of openings 192a located near end 186a. Similarly, panel 160b includes a first pair of openings 192b located near end 184b and a second pair of openings (not shown) located near end 186b. Openings 192a in panel 160a are in alignment with openings 194b in panel 160b. Each of the openings, for example opening 190a, is elongated and disposed with the longitudinal axis thereof substantially parallel to corrugation 166 and thus transversely of cables 70.

As shown in Fig. 10, the openings in the panels 160 enable the connector assemblies 170, 172 to contact or engage both the cables 70 and panels 160 in a manner releasably connecting the panels to the cables. In particular, connector assembly 170 includes a first part 200 which engages the upper surface 202 of panel 160 and which also engages the cable 70 and a second part 204 which engages the upper surface 202 of panel 160, the two parts being removably connected together through opening 190 in a manner which will be shown and described in detail presently. Similarly, connector assembly 172 includes a first part 206 which engages the upper surface 202 of panel 160 and which also engages

the cable 70 and a second part 208 which engages the upper surface 202 of panel 160, the two parts being removably connected together through opening 192 in a manner which will be described in detail presently. The first part 206 of connector assembly 172 is identical to the first part 200 of connector assembly 170. The second part 208 of connector assembly 172 is provided with an eyelet 210 for connection to one end of an auxiliary cable, not shown in Fig. 10, the other end of which is connected to the bridge structural steel 14 such as are of the frame assemblies shown in Fig. 2. For convenience in illustration, both connector assemblies 170 and 172 are shown in Fig. 10 joining a single panel 160 to cables 70. However, the connector assemblies 170 and 172 will also join overlapping end portions of adjacent panels 160 to cables 70 as shown in Fig. 3.

The connector assembly 172 is shown in further detail in the enlarged view of Fig. 11. The first part 206 comprises a plate-like body 216 and a substantially U-shaped hook formation 218 which extends therefrom for engaging cable 70 and which is provided with a threaded end portion 220 which projects through an opening (not shown in Fig. 11) in the plate-like body 222 of the second part 208 of assembly 172. A nut 224 fastens the two parts together.

Figs. 12 and 13 show in further detail the first part 206 of connector assembly 172. As previously mentioned, the first part 206 of connector assembly 172 is identical to the first part 200 of connector assembly 170. The plate-like body 216 of part 206 is elongated rectangular in shape having oppositely directed surfaces 230 and 232 bounded by a pair of side edges 234 and 236 joined by a pair of end edges 238 and 240. The U-shaped hook formation 218 has one end 242 welded or otherwise joined as indicated at 244 to surface 232 of body 216 at a location

slightly inwardly of end 240 and midway between sides 234 and 236. The other end 246 of formation 218 extends beyond surface 230 as shown in Fig. 12. The threaded end portion 220 extends inwardly from end 246. For convenience in illustration, only part 206 of connector assembly 172 is shown in Figs. 12 and 13, it being understood that part 200 of connector assembly 170 is identical.

Figs. 14 and 15 show in further detail the second part 208 of connector assembly 172. The plate-like body 222 of part 208 is elongated rectangular in shape having oppositely-directed surfaces 250 and 252 bounded by a pair of side edges 254 and 256 and joined by a pair of end edges 258 and 260. An opening 262 is provided through body 222 at a location between sides 254 and 256 and offset toward end 258 a short distance from the mid-point between ends 258 and 260. Opening 262 is of a diameter to receive threaded end 220 in a close, sliding relation. Nut 224 shown in Fig. 14 is threaded on end 220 of hook formation 218 to fasten the two connector parts 206 and 208 together. Body 222 is provided with a foot-plate 263 welded or otherwise fixed to the lower surface 252 to stabilize its placement on plate 216 of connector part 206 and on upper surface 202 of panel 160. The structure of part 208 shown and described up to this point is identical to part 204 of connector assembly 170.

Part 208 of connector assembly 172 is provided with a U-shaped eyelet member 210 which is welded or otherwise joined as indicated at 264 to surface 250 of body 222 at a location between opening 262 and edge 260. Eyelet 210 receives one end of an additional or auxiliary supporting cable (not shown in Figs. 14 and 15), the other end of which is secured to the bridge structural steel 14 including the frames shown in Fig. 2.

The platform sections or panels 160 and the connector assemblies 170, 172 are installed to provide a completed platform 30 in the following manner. The panels 160 are placed and arranged on the cables 70 by workmen using scaffolds or the like supported by the bridge 10. Panels 160 are placed on the supporting cables 70 so that the corrugations 166 are disposed transversely of the cables 70. Panels 160 are arranged in a row and in end-to-end overlapping relation transversely of the cables 70. The panels 160 are located so that the openings 190, 192 are aligned with various ones of the cables 70 as shown in Fig. 8. Furthermore, with adjacent ones of the panels 160 being in end-to-end overlapping relation, the openings 190, 192 of the overlapping portions of adjacent panels 160 in a row are aligned with each other and with the corresponding cables 70.

Next, the connector assemblies 170, 172 are installed manually by the workmen. In particular, the first part 200 of connector assembly 170 is manipulated with the flat base inclined upwardly from the upper surface 202 of panel 160 so that the U-shaped hook formation of part 200 can be inserted through the opening in panel 160 and around the cable 70. Then the flat base is pivoted or otherwise manipulated so that cable 70 is within the U-shaped hook formation and the threaded end of the U-shaped hook extends upwardly from surface 202 as shown in Fig. 10. Then, the second part 204 is placed on surface 202 of panel 202 and on the base plate of the first part 202 so that the threaded end of the hook formation extends up through the opening in the base of the second part. Then nut 224 is threaded on the end of the hook formation and tightened onto the base of the second part

204 to hold the two parts of the connector assembly 170 together and in secure engagement with panel 160 and cable 70.

The foregoing operation is repeated for each of the connector assemblies in each of the panels along the row. Then the panels 160 of the next row are installed, the row extending transversely of the cables 70 and the panels of the next row being adjacent sideways to the panels of the first row. The panels of this next row are in end-to-end overlapping relation in the same manner as the panels of the first row. In addition, the panels of this next row are in side-to-side overlapping relation with the panels of the first row as shown in Fig. 3. The connector assemblies are installed in the panels of this next row in a manner similar to that of the first row. The foregoing installation of rows of panels 160 and installation of connector assemblies is continued in a direction longitudinally of the cables 70 until the platform 30 is completed. Connector assemblies 172 of the second type are installed at spaced locations, for example about 20 feet, over the surface of platform 30, and auxiliary cables such as cables 32 are connected between the assemblies 172 and bridge structural steel 32.

As previously described, the platform flooring 74 and particularly the corrugations 166 of panels 160 are very effective in containing debris such as paint chips removed from the bridge steel 14 and frames thereof as well as paint droppings or spillage during the actual painting operation. In some situations, particularly under windy conditions, it is necessary to take extra measures to confine the debris and paint and prevent its movement or escape due to wind or other effects. Accordingly, an enclosure is defined between platform 30 and the bridge by means of tarpaulins as shown in Fig. 16. In particular, tarpaulin enclosures 270 and 272 are provided

extending along the left-hand and right-hand sides of platform 30. The lower end of tarpaulin enclosure 270 is fastened to the side edge of platform 30 by lumber stripping 274 or the like screwed to the panels 160 of platform 30 to provide a continuous seal. The upper end of tarpaulin enclosure 270 extends over the bridge railing 24 and is fastened to the bridge deck 12 or sidewalk thereof by the combination of cable 276 extending along the deck and lumber stripping 278 or the like secured to the deck. Similarly, tarpaulin enclosure 272 is fastened at the lower end to platform 30 by stripping 280 and at the upper end to deck 12 by cable 282 and stripping 284. If desired, similar tarpaulin enclosures can be provided at opposite ends of platform 30. Thus, platform 30, the tarpaulin enclosures and the bridge deck 12 define a confined region or volume for containing debris from the operations being performed.

By way of example, in an illustrative platform, the overall width is about 32 feet or slightly less than the width of the bridge deck 12 and the overall length of the platform is about 140 feet which is approximately the span between piers 18, 20. Panels 160 are rigid type B corrugated steel decking panels each 11 feet in length and 3 feet in width. The panels 160 are 22 gage, $1\frac{1}{2}$ inch deep ASTM A446 steel having a yield strength of $FY=33KSI$ (minimum). A minimum panel overlap of 6 inches in longitudinal and lateral directions is provided. Cables 70 are seven in number, each $\frac{1}{2}$ inch in diameter and spaced apart about 5 feet. Cables 70 are 6 x 19 IWRC cable of plain steel with a breaking strength of 41,200 pounds or greater. Each panel 160 is connected at two locations to the corresponding cable. The location of platform 30 is about $11\frac{1}{2}$ feet below bridge deck 12. The typical maximum applied load for which platform 30 is designed is 11 pounds per square foot. The cables 70 are

supported every 20 feet by the auxiliary support cables such as those designated 32.

Platform 30 of the present invention by virtue of the combination of support cables 70 and corrugated decking panels 160 is safe, provides a sufficiently rigid support for workmen to stand and walk on and is relatively simple in structure and light in weight. Rigidity is important in that workmen can walk along platform 30 with no lowering. The corrugations 166 enhance the strength to weight ratio of panels 160. In addition, the corrugations facilitate containment of debris. The provision of connector assemblies 170 and 172 in cooperation with openings 190 and 192 in the panels provide a quick, easy and effective way to both erect and dismantle the bridge platform of the present invention. The provision of individual panels 160 releasably connected to cables 70 provides convenient and quick access through the flooring 74 in emergency situations. Thus in such situations it is not necessary to cut through the platform flooring which otherwise could destroy the integrity of debris containment provided by enclosures such as that shown in Fig. 16. Furthermore, the time required to cut through flooring could have serious consequences in emergency and critical situations, and such cutting could impair the structural integrity of the platform and therefore its safety.

It is therefore apparent that the present invention accomplishes its intended objects. While an embodiment of the present invention has been described in detail that is for the purpose of illustration and not limitation.

The Claims

1. A platform for installation below the deck of a bridge and extending along a section of the bridge for supporting persons performing work on the bridge and for collecting debris resulting from the work, said platform comprising:

- a) a plurality of cables extending along the bridge and in spaced relation to each other and in a plane substantially parallel to the plane of the deck;
- b) means at each end of said cables for securing said cables to the bridge so that the plane of the cables is at a desired distance below the portion of the bridge upon which work is to be performed;
- c) a plurality of flooring sections each extending transversely of the cables and resting on said cables, said flooring sections being arranged in side-by-side relation longitudinally of the cables; and
- d) means for releasably securing said flooring sections to said cables.

2. A bridge platform according to claim 1, wherein said means for securing said cables to the bridge secures said cables to spaced-apart piers of the bridge.

3. A bridge platform according to claim 2, wherein said means for securing said cables to the bridge piers comprises a pair of compression clamp structures, one on each of the piers, and said cables are connected at opposite ends thereof to said clamp structures.

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4. A bridge platform according to claim 1, wherein said flooring sections comprise elongated rectangular decking panels arranged in end-to-end overlapping relation transversely of the cables and in side-to-side overlapping relation longitudinally of the cables.

5. A bridge platform according to claim 4, wherein said decking panels are corrugated with the corrugations extending transversely of the cables.

6. A bridge platform according to claim 1, wherein said flooring sections comprise corrugated elongated rectangular decking panels with the corrugations extending transversely of the cables.

7. A bridge platform according to claim 1, wherein said means for releasably securing said flooring sections to said cables comprises a plurality of connector assemblies each comprising a first part which engages the upper surface of the flooring section and the cable, a second part which engages the upper surface of the flooring section and means extending through the flooring section for releasably connecting the two parts together.

8. A bridge platform according to claim 7, wherein said first part comprises a plate-like body and a substantially U-shaped hook formation extending from said body for engaging the cable and having a threaded free end and wherein said second part comprises a plate-like body having an opening therethrough for receiving therethrough said threaded end of said hook formation of said first part so that a nut can be threaded on said free end to fasten said first and second parts together.

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9. A bridge platform according to claim 7, wherein some of said connector assemblies further include means for connection to one end of an auxiliary supporting cable, the other end of which is secured to the bridge to provide additional support for said platform.

10. A bridge platform according to claim 1, further including tarpaulin enclosures extending between said platform and the bridge for defining a region between said platform and the bridge which enhances containment of the debris.

11. A method for installing a platform below the deck of a bridge for supporting persons performing work on the bridge and for collecting debris resulting from the work, said method comprising the steps of:

- a) providing a plurality of cables and securing the cables to the bridge so that they extend along the bridge and in spaced relation to each other and in a plane substantially parallel to the deck at a distance below the portion of the bridge upon which work is to be performed;
- b) providing a plurality of flooring sections each comprising corrugated elongated rectangular decking panels wherein the corrugations extend along the length of the panel;
- c) placing the flooring sections on the cables with the corrugations extending transversely of the cables and with the sections in end-to-end and side-to-side contacting relation to each other; and

- d) fastening the flooring sections to the cables by means of releasable connector assemblies each engaging the flooring sections and a corresponding one of the cables.

12. A method according to claim 11, wherein the cables are secured to neighboring piers of the bridge so that the platform extends between the neighboring piers.

13. A method according to claim 11, wherein said flooring sections are arranged in end-to-end overlapping relation transversely of the cables and in side-to-side overlapping relation longitudinally of the cables.

14. A method according to claim 11, wherein said flooring sections are fastened to the cables by placing a first part of a connector assembly so that a portion thereof is in engagement with the upper surface of the flooring section and another portion thereof is in engagement with the cable through an opening in the flooring section, placing a second part of the connector assembly in engagement with the upper surface of the flooring section and releasably connecting the first and second parts together.

ABSTRACT

A bridge platform and method of erecting the same wherein a plurality of cables extend longitudinally of the bridge in spaced relation below the deck or roadway and steel support structure of the bridge, which cables are supported at opposite ends by the spaced-apart vertical piers of the bridge, and wherein a plurality of platform flooring panels or sections are supported on the cables, extend laterally of the bridge, are arranged side-by-side along the length of the bridge between the piers and are removably secured to the cables. The cables are attached to the bridge piers by compression clamp structures. The platform flooring sections comprise elongated rectangular corrugated decking panels and are arranged in end-to-end overlapping relation transversely of the bridge, side-to-side overlapping relation longitudinally along the bridge and with the corrugations extending transversely of the cables. The corrugations maximize the strength-to-weight ratio of the platform flooring and provide recesses or receptacles to contain debris and facilitate its collection and removal. Each of the platform flooring sections is releasably connected at spaced locations to the supporting cables on which it rests. This is provided by connector assemblies each comprising a first part which engages the upper surface of the flooring section and the cable and a second part which engages the upper surface of the flooring section, the two parts being removably connected together through a small opening in the flooring. As a result, individual flooring sections can be removed to provide access through the flooring in emergency or critical situations while at the same time allowing the remainder of the flooring to retain collected debris.

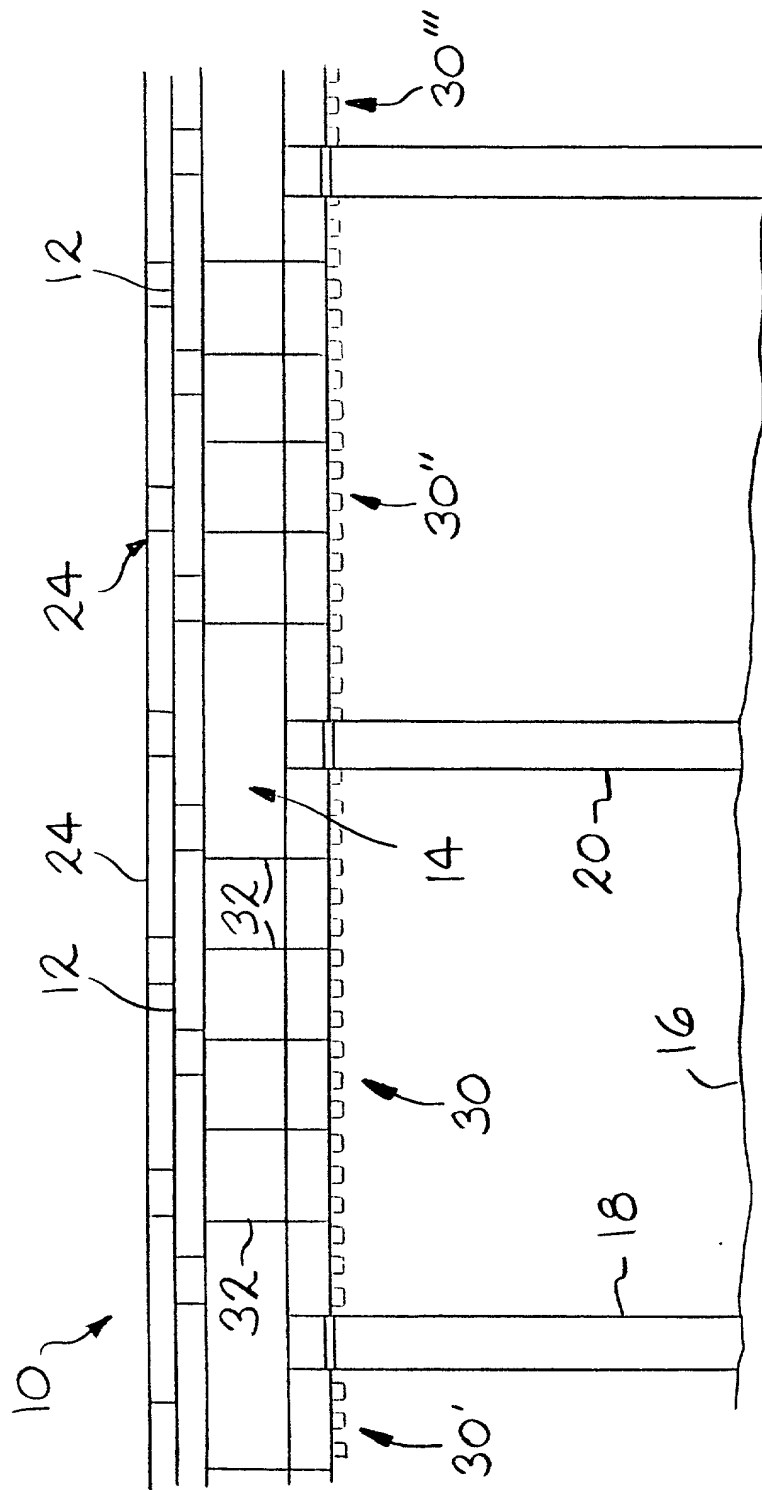


FIG 1

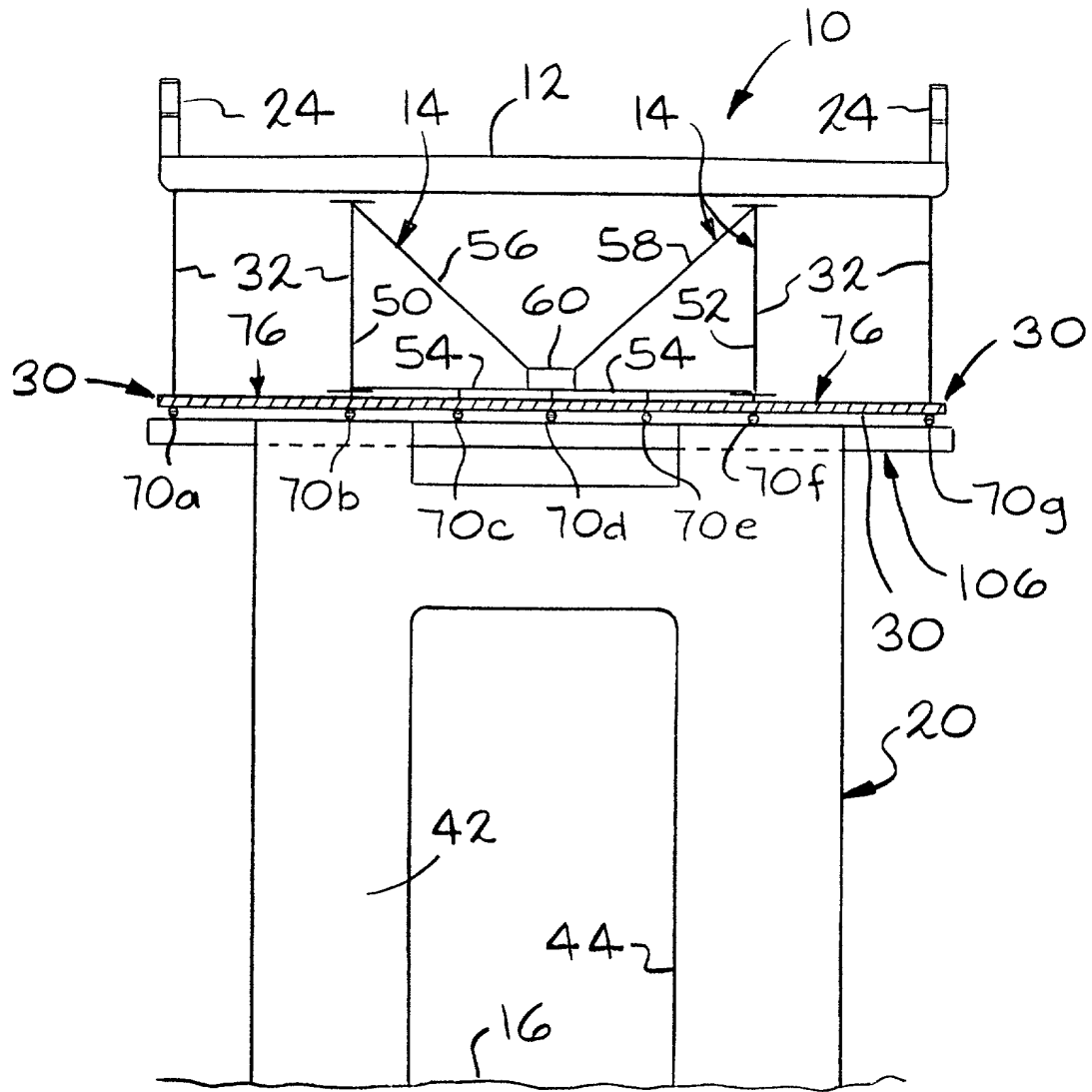
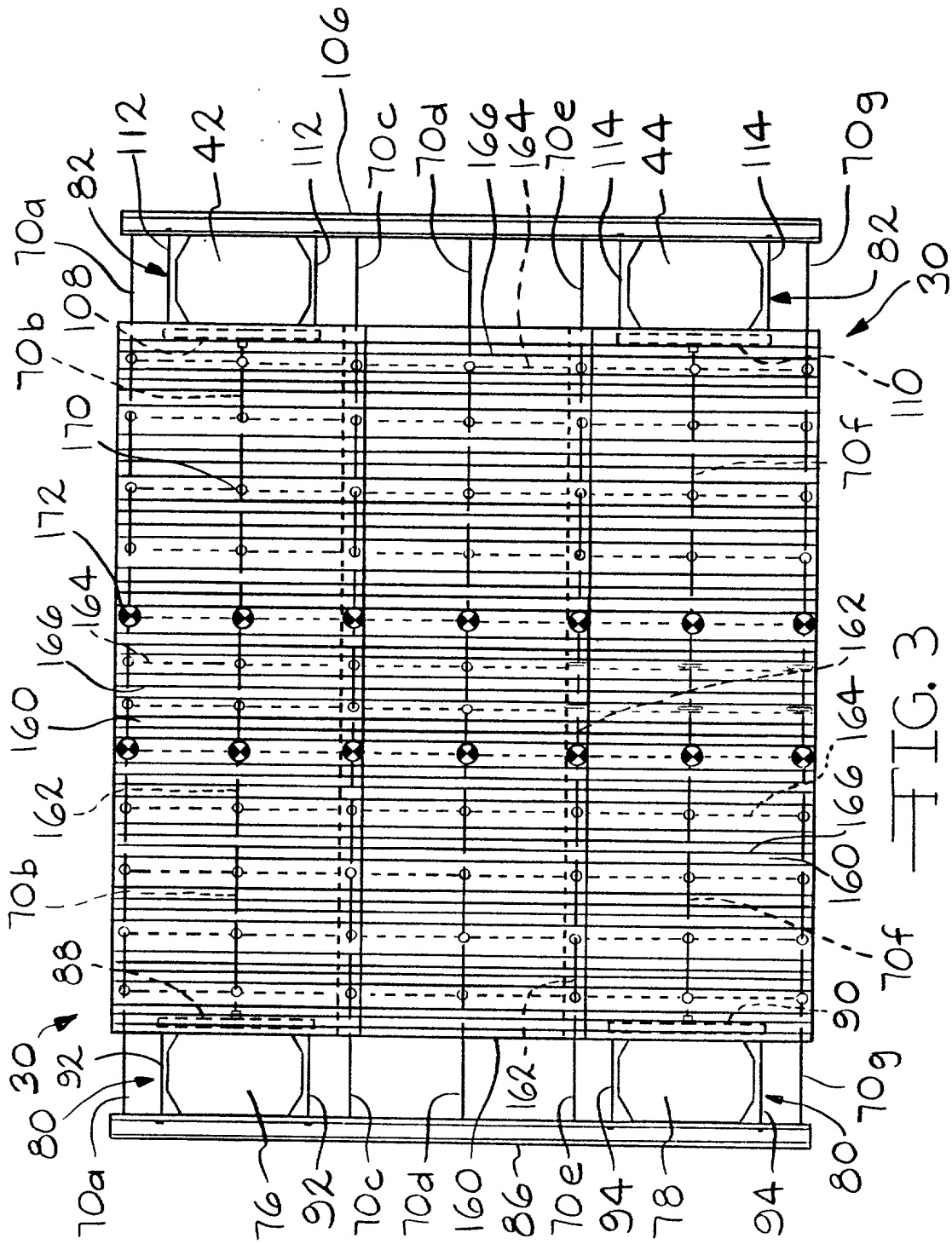
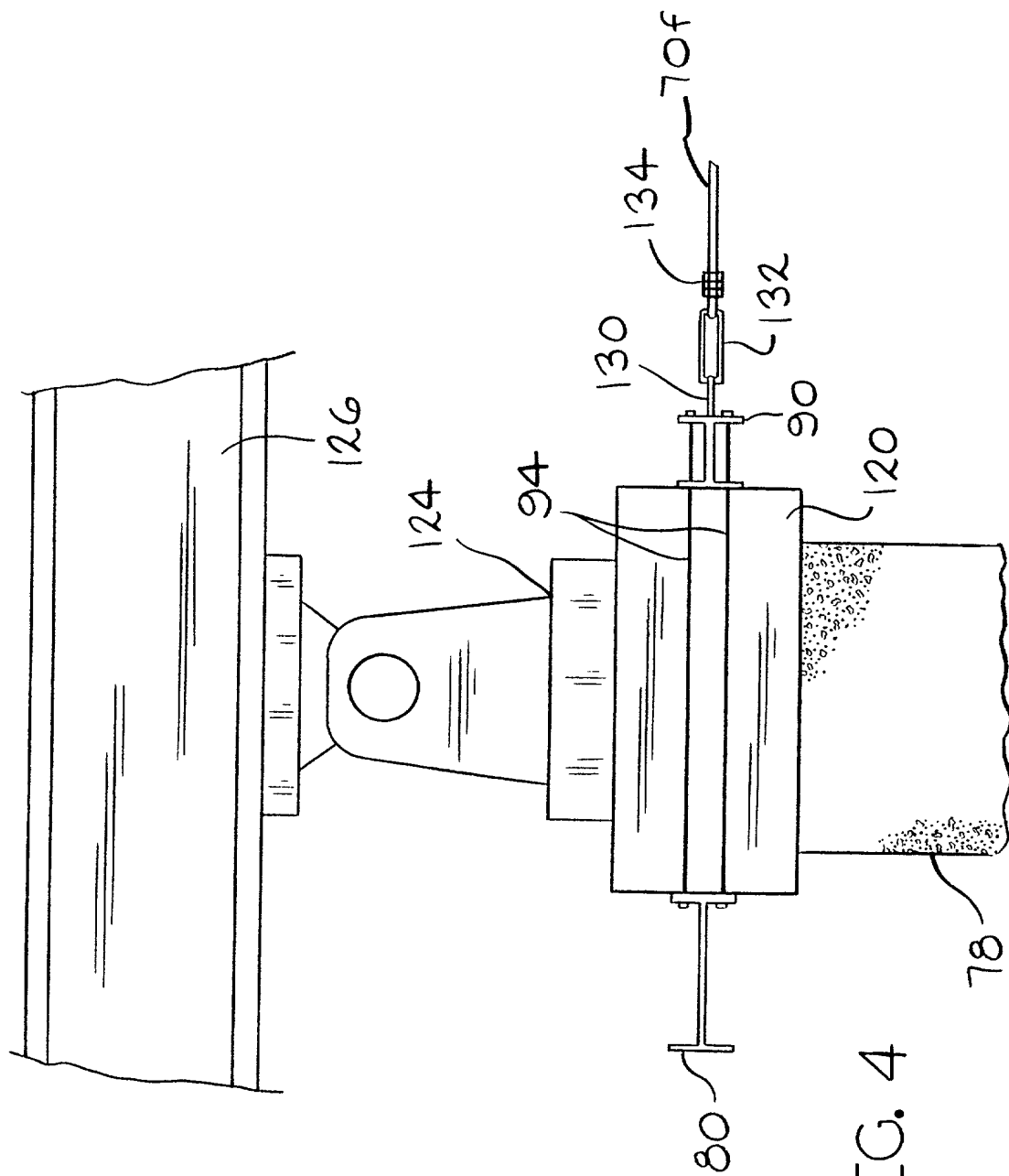
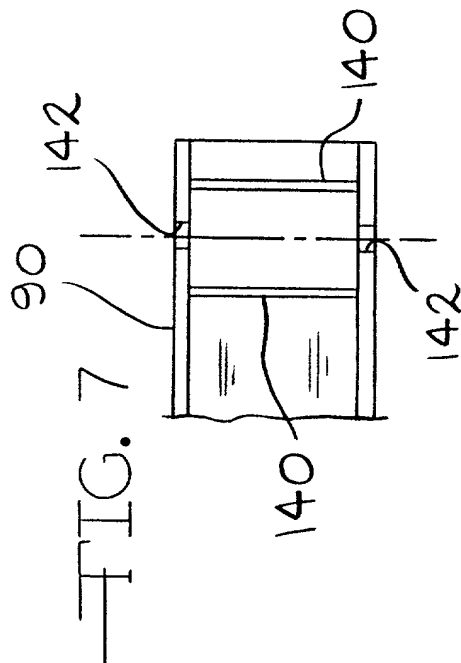
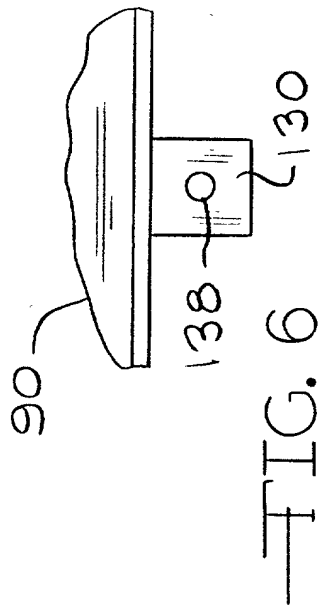
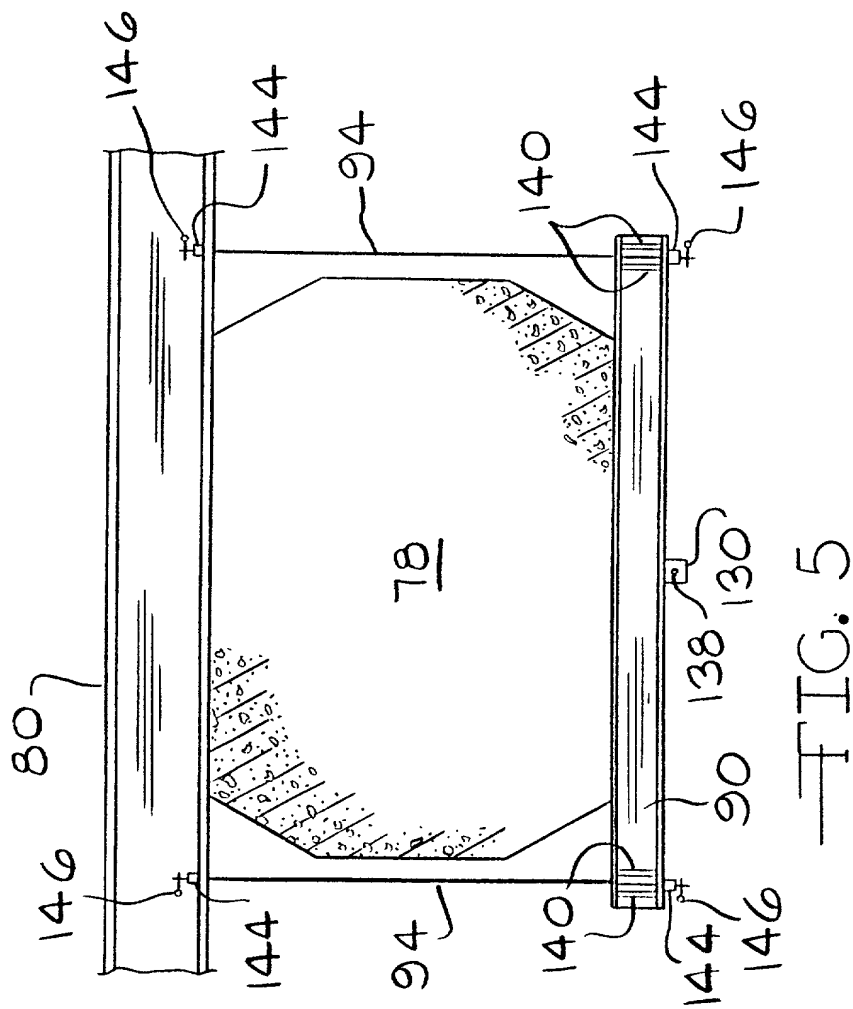
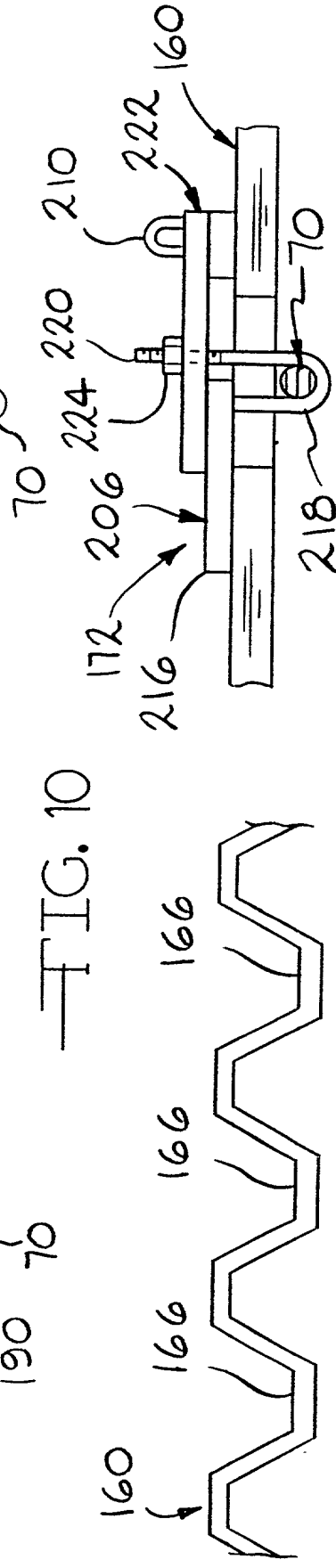
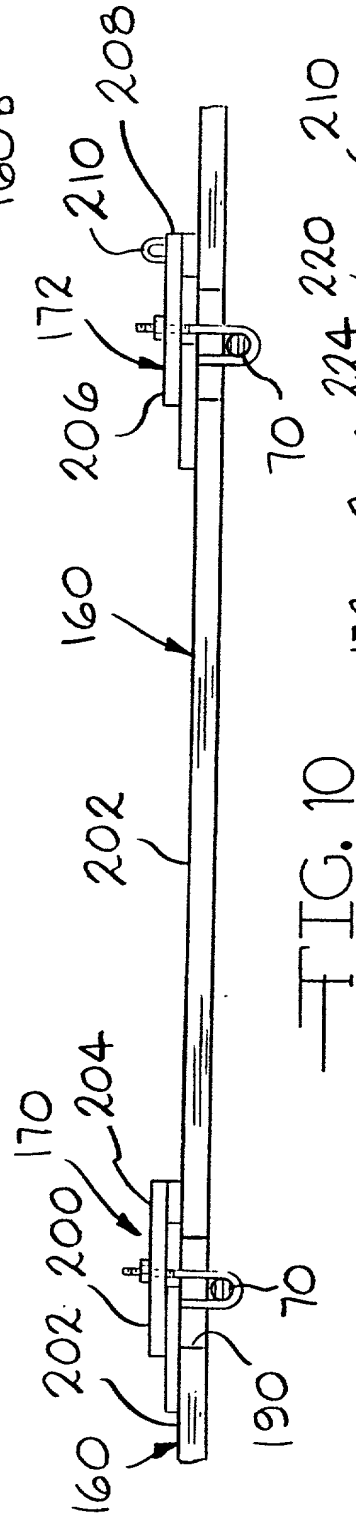
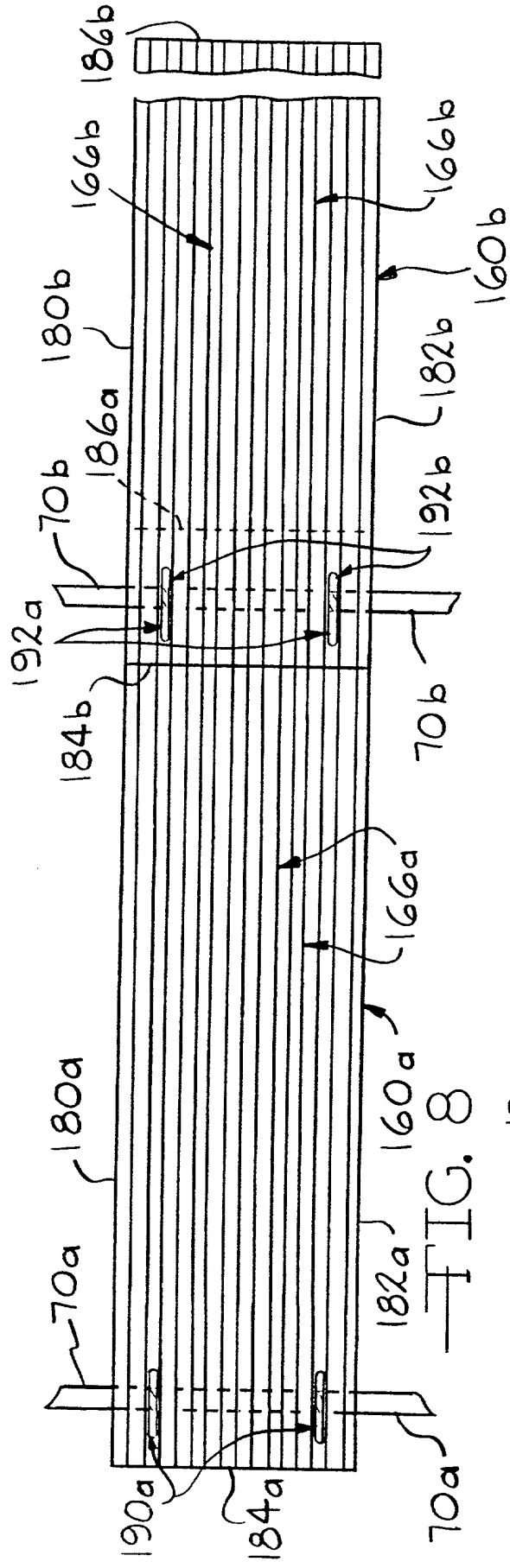


FIG. 2



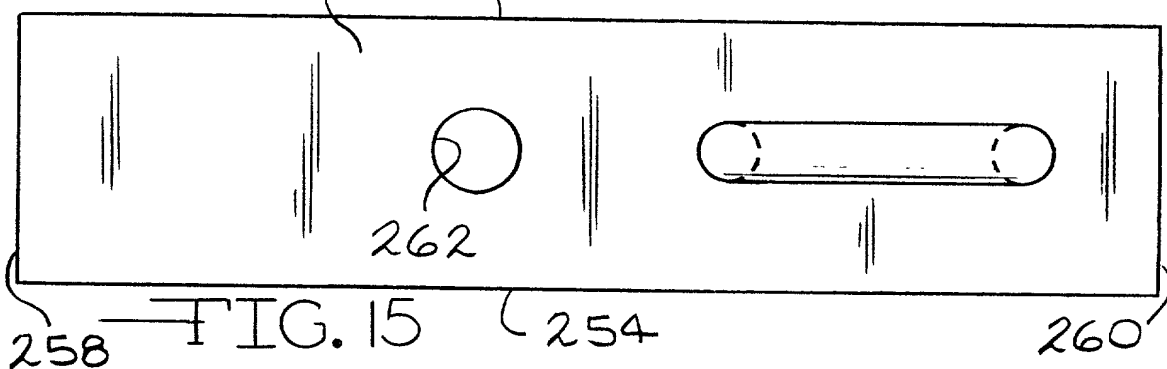
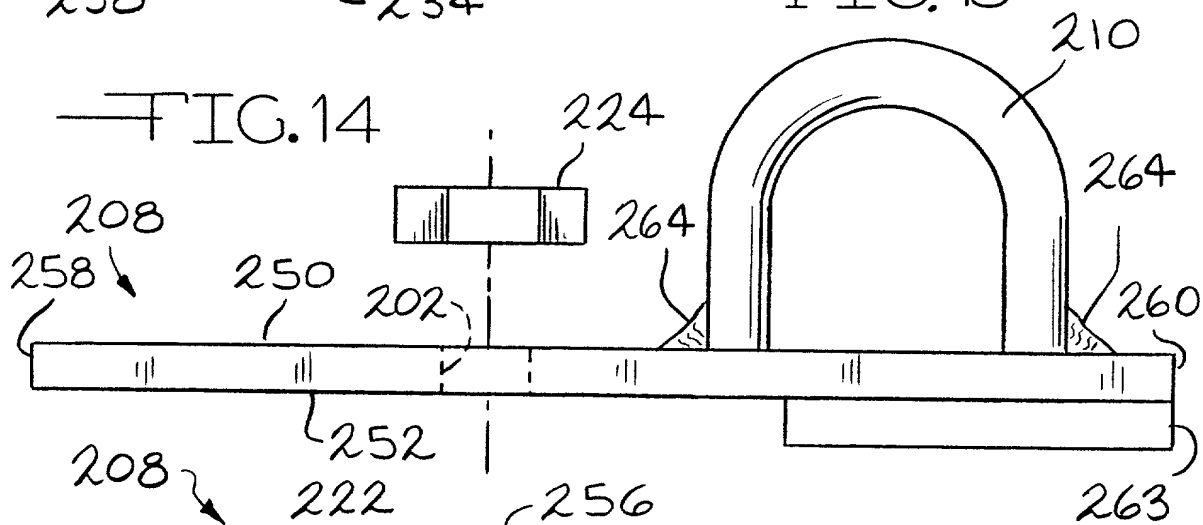
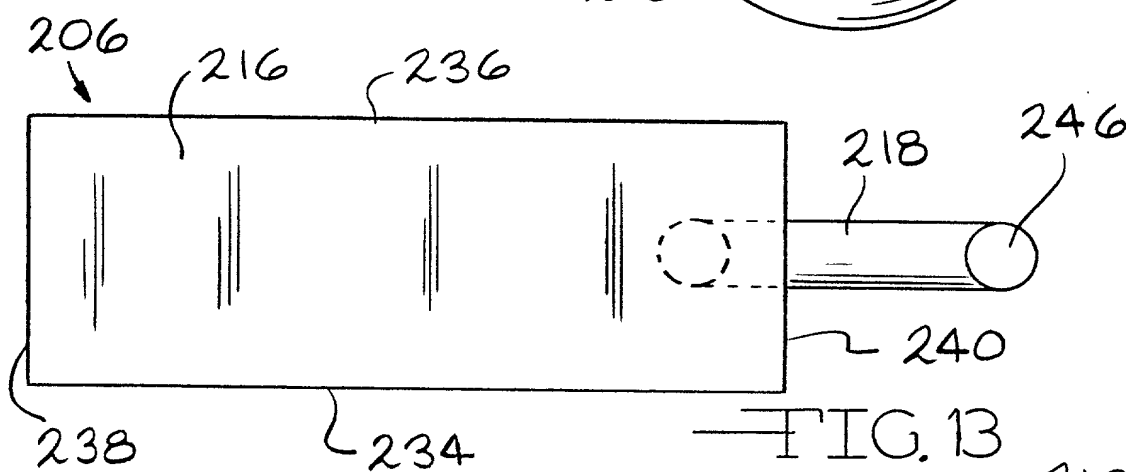
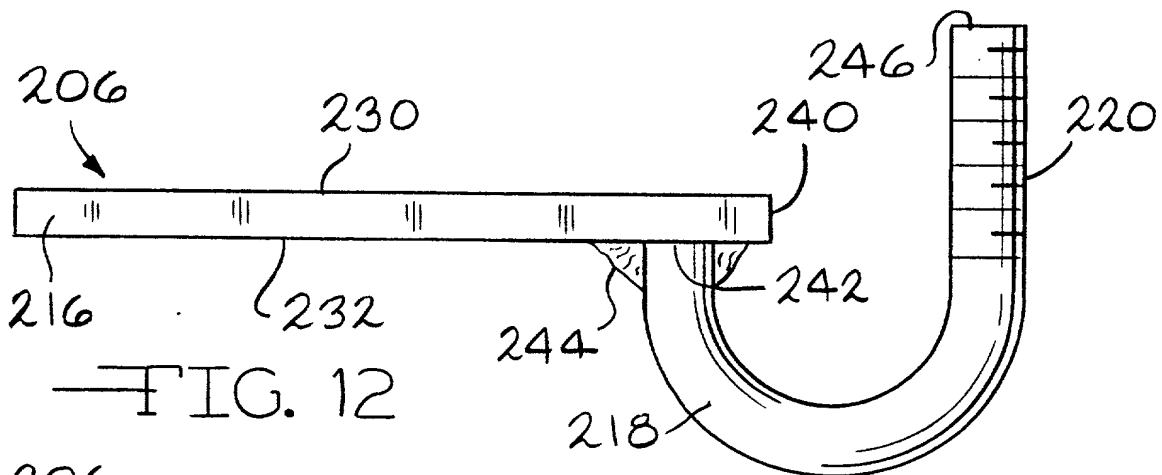






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FIG. 11



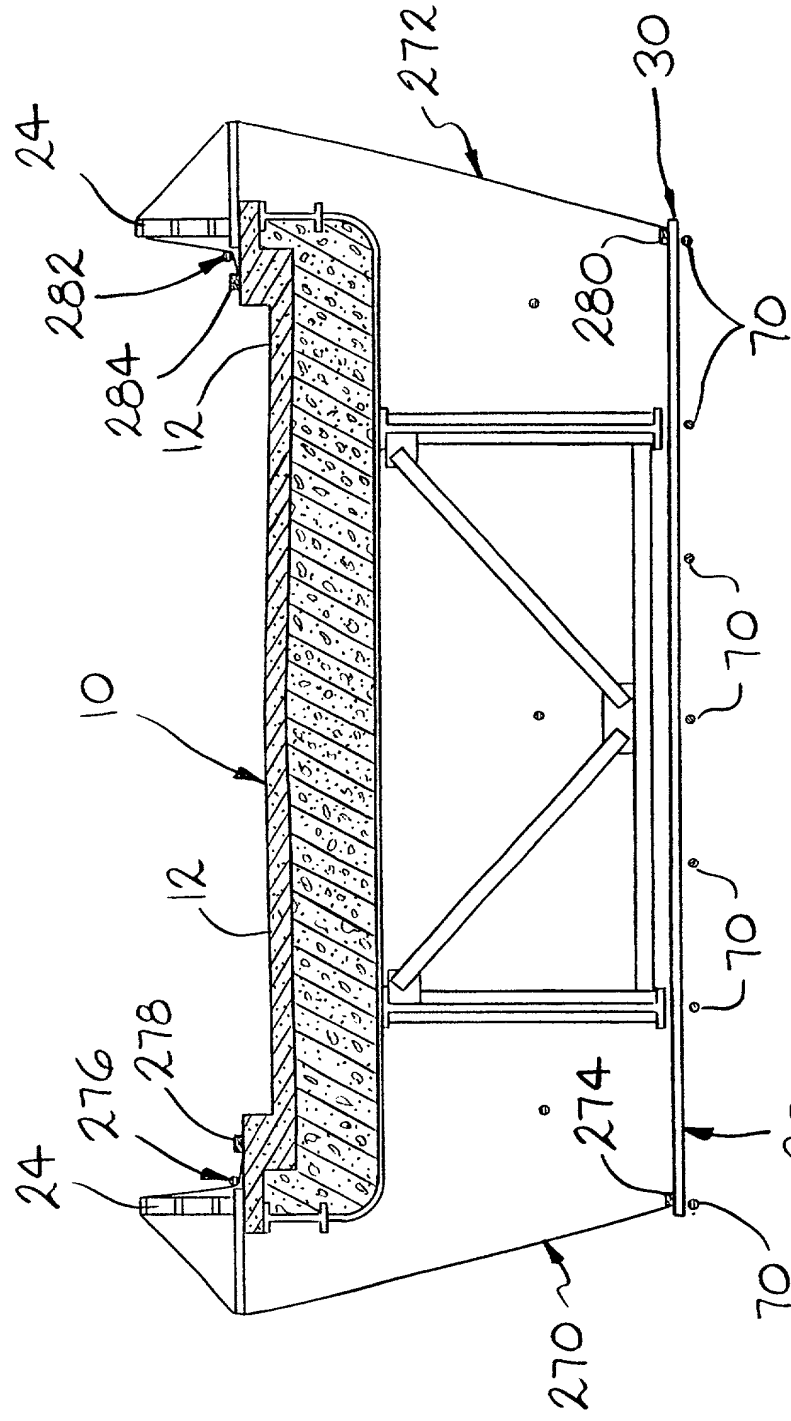


FIG. 16

Attorney's Docket No. 22908.0000

PATENT

COMBINED DECLARATION AND POWER OF ATTORNEY

(ORIGINAL, DESIGN, NATIONAL STAGE OF PCT, SUPPLEMENTAL,
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As a below named inventor, I hereby declare that:

TYPE OF DECLARATION

This declaration is of the following type: (check one applicable item below)

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☐ divisional

☐ continuation

☐ continuation-in-part (CIP)

INVENTORSHIP IDENTIFICATION

WARNING: If the inventors are each not the inventors of all the claims an explanation of the facts, including the ownership of all the claims at the time the last claimed invention was made, should be submitted.

My residence, post office address and citizenship are as stated below next to my name, I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

TITLE OF INVENTION

BRIDGE PLATFORM

SPECIFICATION IDENTIFICATION

the specification of which: (complete (a), (b) or (c))

- (a) /X/ is attached hereto.
- (b) /_/ was filed on _____ as /_/ Serial No. _____ or /_/ Express Mail No., as Serial No. _____ not yet known _____ and was amended on _____ (if applicable).

NOTE: Amendments filed after the original papers are deposited with the PTO which contain new matter are not accorded a filing date by being referred to in the declaration. Accordingly, the amendments involved are those filed with the application papers or, in the case of a supplemental declaration, are those amendments claiming matter not encompassed in the original statement of invention or claims. See 37 CFR 1.67.

- (c) /_/ was described and claimed in PCT International Application No. _____ filed on _____ and as amended under PCT Article 19 on _____ (if any).

ACKNOWLEDGMENT OF REVIEW OF PAPERS AND DUTY OF CANDOR

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information

- which is material to patentability as defined in 37, Code of Federal Regulations, § 1.56.

(also check the following items, if desired)

- /_/ and which is material to the examination of this application, namely, information where there is a substantial likelihood that a reasonable examiner would consider it important in deciding whether to allow the application to issue as a patent, and
- /_/ In compliance with this duty there is attached an information disclosure statement in accordance with 37 CFR 1.98.

PRIORITY CLAIM (35 U.S.C. § 119)

I hereby claim foreign priority benefits under Title 35, United States Code, § 119 of any foreign application(s) for patent or inventor's certificate or of any PCT international application(s) designating at least one country other than the United States of America listed below and have also identified below any foreign application(s) for patent or inventor's certificate or any PCT international application(s) designating at least one country other than the United States of America filed by me on the same subject matter having a filing date before that of the application(s) of which priority is claimed.

(complete (d) or (e))

- (d) /X/ no such applications have been filed.
(e) /_/ such applications have been filed as follows.

NOTE: Where item (c) is entered above and the International Application which designated the U.S. claimed priority check item (e), enter the details below and make the priority claim.

A. PRIOR FOREIGN/PCT APPLICATION(S) FILED WITHIN 12 MONTHS
(6 MONTHS FOR DESIGN) PRIOR TO THIS APPLICATION
AND ANY PRIORITY CLAIMS UNDER 35 U.S.C. § 119

COUNTRY (OR INDICATE IF PCT)	APPLICATION NUMBER	DATE OF FILING (day, month, year)	PRIORITY CLAIMED UNDER 37 USC 119
			/ / YES NO / /
			/ / YES NO / /
			/ / YES NO / /
			/ / YES NO / /
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NOTE: If the application filed more than 12 months from the filing date of this application is a PCT filing forming the basis for this application entering the United States as (1) the national stage, or (2) a continuation, divisional, or continuation-in-part, then also complete ADDED PAGES TO COMBINED DECLARATION AND POWER OF ATTORNEY FOR DIVISIONAL, CONTINUATION OR CIP APPLICATION for benefit of the prior U.S. or PCT application(s) under 35 U.S.C. § 120.

POWER OF ATTORNEY

I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith. (List name and registration number)

Edwin T. Bean, Jr.	Reg. No. 16,639
Martin G. Linihan	Reg. No. 24,926
James C. Simmons	Reg. No. 28,474
Michael F. Scalise	Reg. No. 34,920
M. Bud Nelson, Ph.D.	Reg. No. 35,300

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/_/ Attached as part of this declaration and power of attorney is the authorization of the above-named attorney(s) to accept and follow instructions from my representative(s).

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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

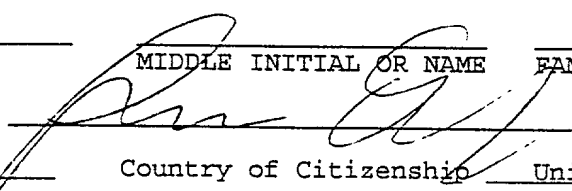
SIGNATURE(S)

Full name of sole or first inventor Lambros Apostolopoulos

(GIVEN NAME)

MIDDLE INITIAL OR NAME

FAMILY (OR LAST NAME)

Inventor's signature 

Date 7-7-95

Country of Citizenship

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Residence 70 Cherrywood Drive, Amherst, New York 14221

Post Office Address same as above

Full name of second joint inventor, if any _____

(GIVEN NAME)

MIDDLE INITIAL OR NAME

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